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4. An electrolysis cell as claimed in claim 2, wherein the at least one ion-conducting layer which relates to that surface of the solid electrolyte which is in contact with the anode compartment is a polymer electrolyte, a ceramic electrolyte, a compound which intercalates the alkali metal ions of the at least one alkali metal salt [as claimed in claim 1], or a mixture made from two or more of these.
6. An electrolysis cell as claimed in claim 2, wherein the at least one ion-conducting layer which relates to that surface of the solid electrolyte which is in contact with the cathode compartment is an alkali metal salt, where the alkali metal is identical with that of the alkali metal salt [as claimed in claim 1], a compound which intercalates the alkali metal ions of the at least one alkali metal salt [as claimed in claim 1], or a mixture made from two or more of these.
7. An electrolysis cell as claimed in claim 3, wherein the at least one ion-conducting layer which relates to that surface of the solid electrolyte which is in contact with the cathode compartment is an alkali metal salt, where the alkali metal is identical with that of the alkali metal salt [as claimed in claim 1], a compound which intercalates the alkali metal ions of the at least one alkali metal salt [as claimed in claim 1], or a mixture made from two or more of these.
8. An electrolysis cell as claimed in claim 4, wherein the at least one ion-conducting layer which relates to that surface of the solid electrolyte which is in contact with the cathode compartment is an alkali metal salt, where the alkali

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metal is identical with that of the alkali metal salt [as claimed in claim 1], a compound which intercalates the alkali metal ions of the at least one alkali metal salt [as claimed in claim 1], or a mixture made from two or more of these.

9. An electrolysis cell as claimed in claim 5, wherein
- (a) the at least one alkali metal salt [as claimed in claim 1] is a lithium salt or a mixture made from two or more of these, and
  - (bb) the compound which intercalates lithium ions is graphite  $C_6Li$  or a mixture of these, or
  - (b) the at least one alkali metal salt [as claimed in claim 1] is a sodium salt or a mixture made from two or more of these, and
  - (aa) the alkali metal salt which relates to that surface of the solid electrolyte which is in contact with the cathode compartment has been selected from the group consisting of NaOH,  $NaNH_2$ , NaCl, NaBr, NaI, NaOR and a mixture made from two or more of these,
  - (bb) the compound which intercalates sodium is graphite,  $C_8Na$  or a mixture of these, or
  - (c) the at least one alkali metal salt [as claimed in claim 1] is a potassium salt or a mixture made from two or more of these, and
  - (aa) the alkali metal salt which relates to that surface of the solid electrolyte which is in contact with the cathode compartment has been selected from the group consisting of KOH,  $KNH_2$ , KCl, KBr, KI, KOR and a mixture

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made from two or more of these,

- (bb) the compound which intercalates potassium ions is graphite,  $C_8K$  or a mixture of these,

where R is straight-chain or branched-chain alkyl having from 1 to 5 carbon atoms.

10. An electrolysis cell as claimed in [any one of] claim 1, wherein

- (a) the at least one alkali metal salt as claimed in claim 1 is a lithium salt or mixture made from two or more of these, and the cathode is composed of lithium, or
- (b) the at least one alkali metal salt as claimed in claim 1 is a sodium salt or a mixture made from two or more of these, and the cathode is composed of sodium or
- (c) the at least one alkali metal salt as claimed in claim 1 is a potassium salt of a mixture made from two or more of these and the cathode is composed of potassium.

12. An electrolysis cell as claimed in claim 11, wherein the at least one alkali metal salt [as claimed in claim 1] is a lithium salt or a mixture made from two or more of these, and the electrolyte melt is an LiOH melt, or

the at least one alkali metal salt [as claimed in claim 1] is a sodium salt or a mixture made from two or more of these and the electrolyte melt has been selected from the group consisting of an NaOH melt, an  $NaNH_2$  melt and a mixture of these, or

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the at least one alkali metal salt [as claimed in claim 1] is a potassium salt or a mixture made from two or more of these and the electrolyte melt has been selected from the group consisting of a KOH melt, a KNH<sub>2</sub> melt and a mixture of these.

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